

Sept. 27, 1960

W. E. THORNTON-TRUMP
MOBILE BOOM-SUPPORTED PLATFORM

2,954,092

Filed Aug. 26, 1957

3 Sheets-Sheet 1

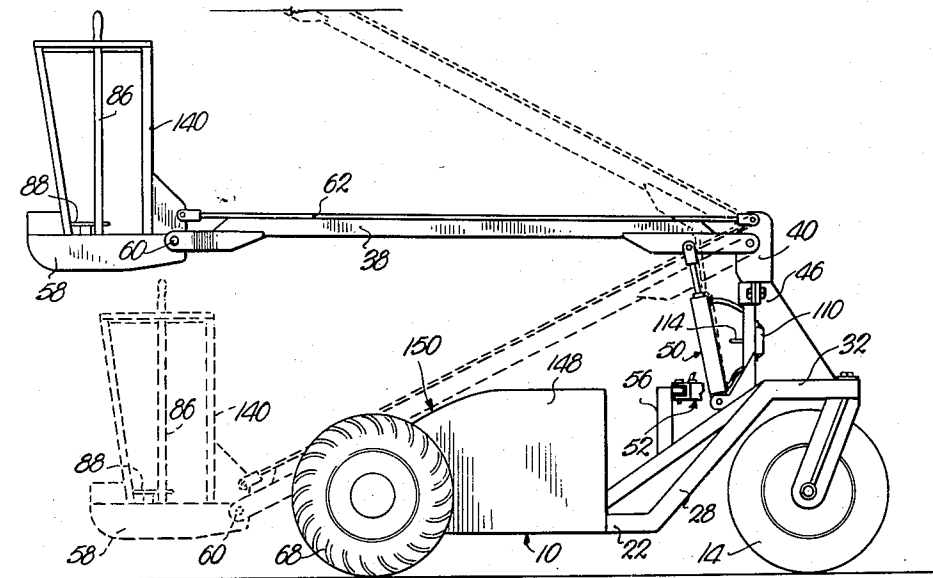


Fig. 1.

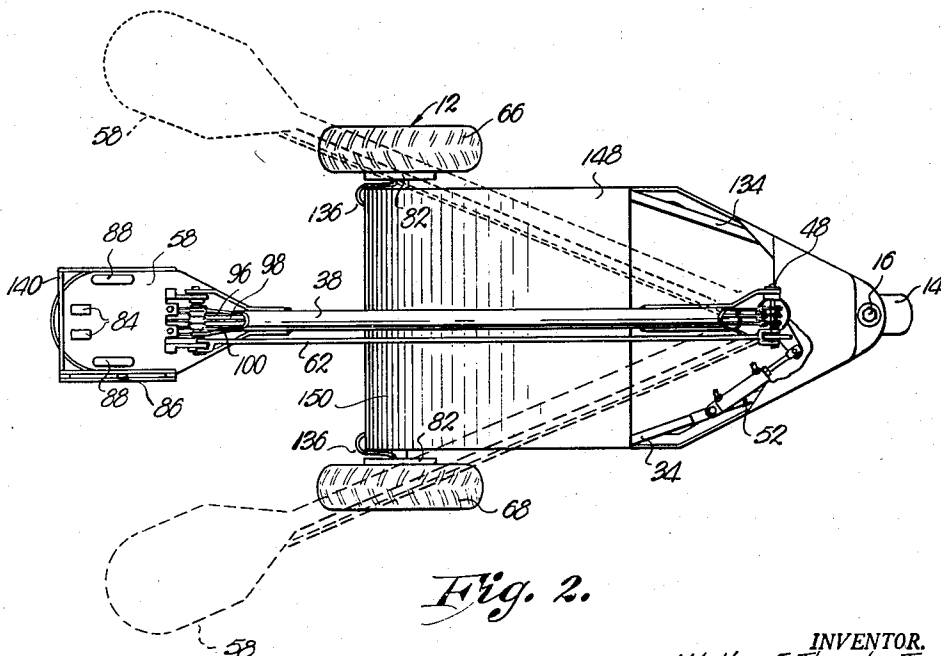


Fig. 2.

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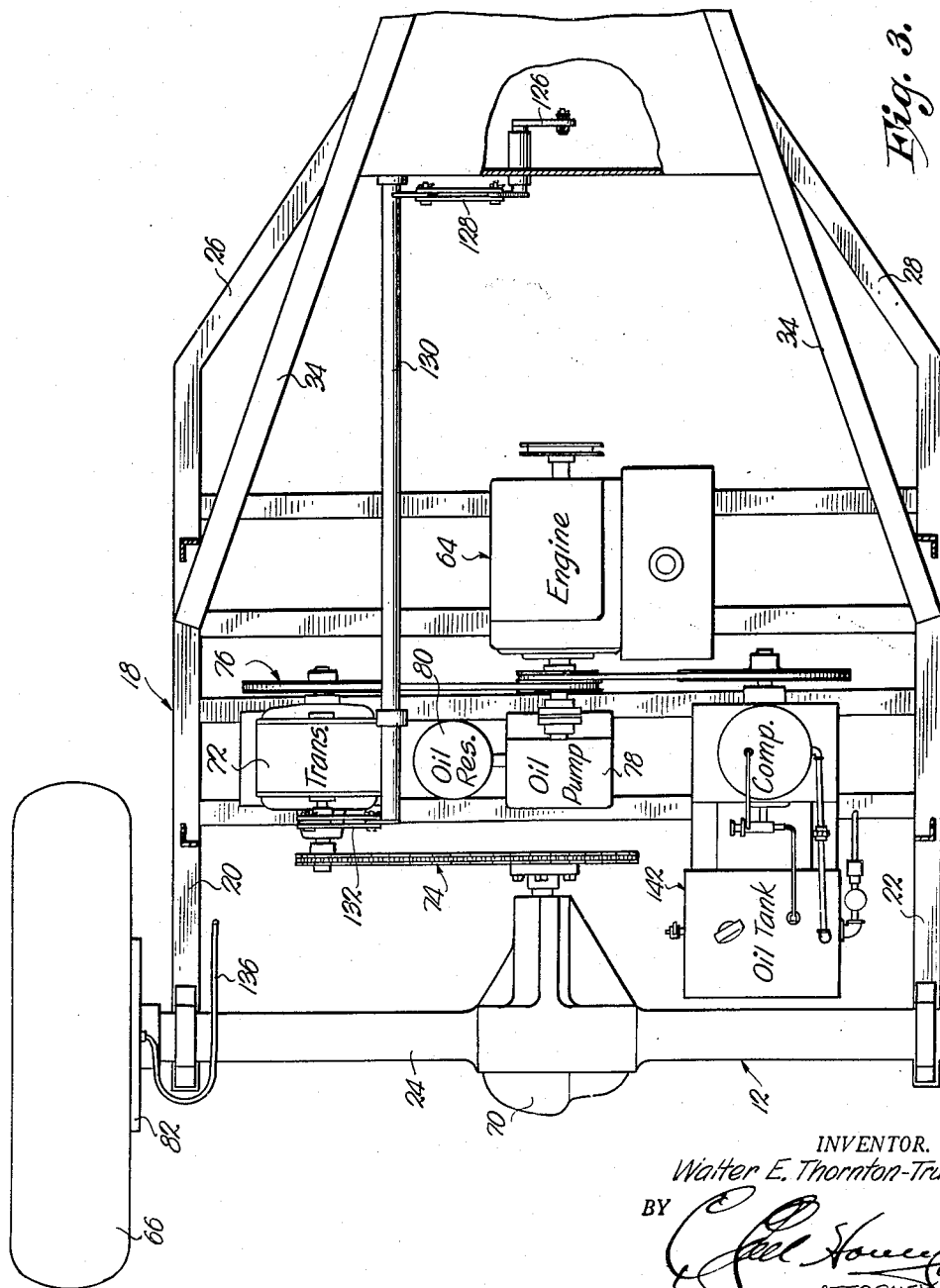


Fig. 3.

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3 Sheets-Sheet 3

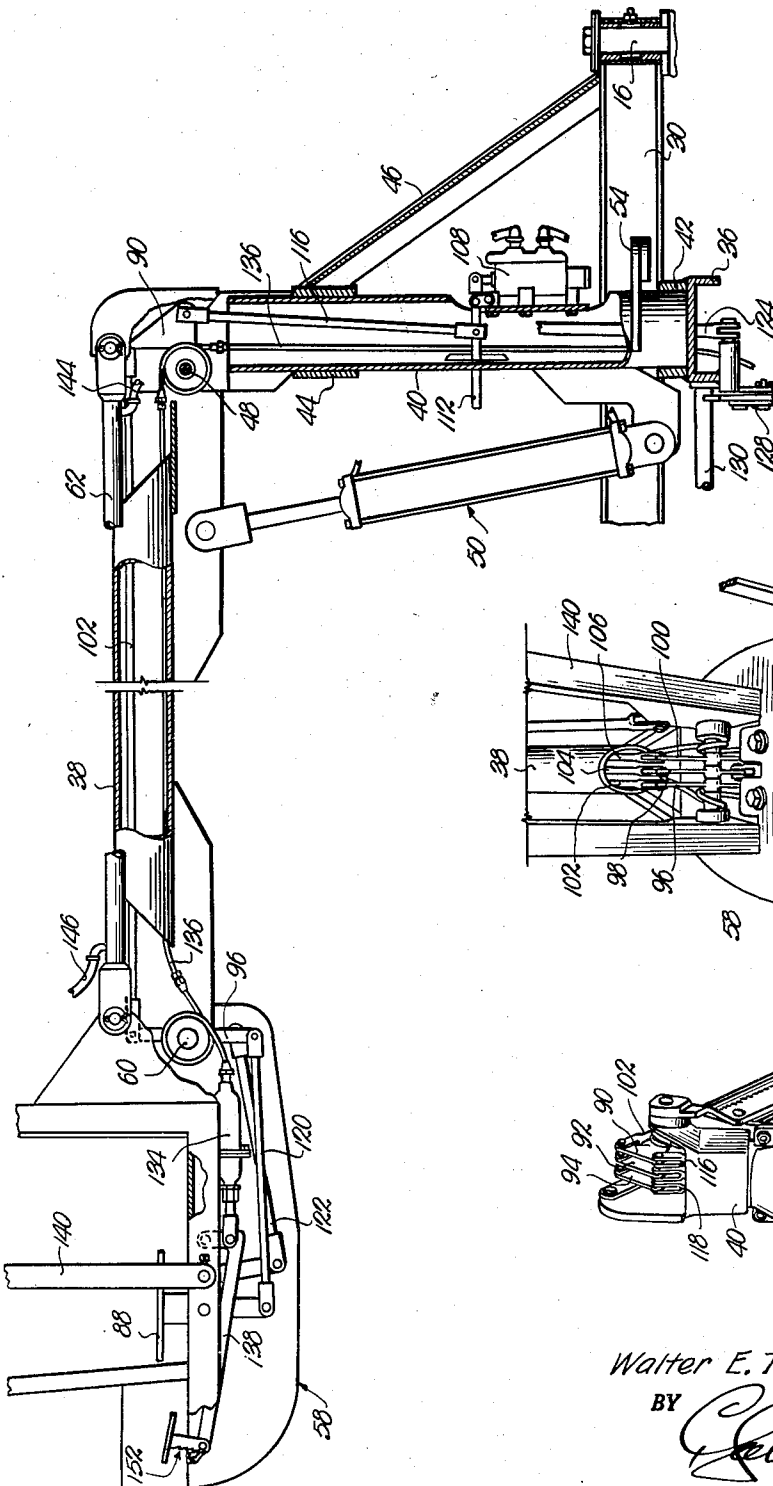


Fig. 4.

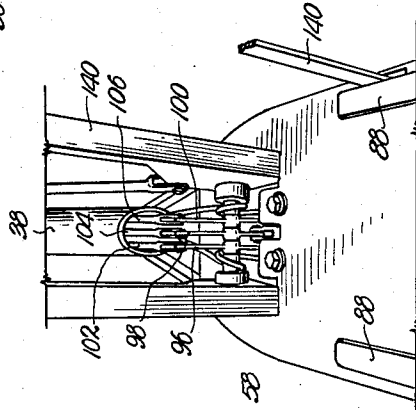


Fig. 6.

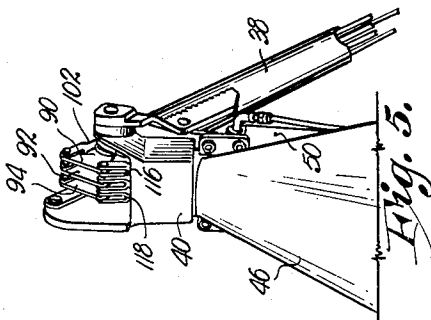


Fig. 5.

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2,954,092

MOBILE BOOM-SUPPORTED PLATFORM

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1 Claim. (Cl. 182-2)

This invention relates to elevatable platform structure, and more particularly to a mobile vehicle having swingable boom means as a part thereof supporting a workman's platform, the primary object being to incorporate in a relatively small, inexpensive machine, all components necessary for rendering the same highly maneuverable in a number of directions.

It is the most important object of the present invention to provide a machine for elevating a workman that can be operated in its entirety by the single user thereof to not only traverse the ground, but to move vertically and horizontally permitting the workman to place himself in position for carrying on desired operations at elevated heights.

It is an essential feature of the instant invention to provide an assembly of parts arranged such that the platform may be lowered substantially to the ground notwithstanding the relatively small dimensions of the vehicle itself which supports the boom structure aforementioned.

Another important object of the instant invention is to provide a machine as above set forth that is properly balanced in all directions to essentially obviate the danger of injury to the workman by virtue of upset or other accident occurring during normal use of the machine.

A further object of the present invention is to provide a novel steering arrangement controlled from the platform at the outermost end of the boom and operable entirely through a brake assembly that guides the vehicle as one of its wheels pivots freely about a vertical axis.

Another important object of the present invention lies in the arrangement of parts that provide for control of both horizontal and vertical movement of the boom, fore and aft movement of the vehicle, and steering, all through the boom structure and without interference with its freedom of vertical and horizontal swinging movement.

In the drawings:

Figure 1 is a side elevational view of a mobile boom-supported platform made pursuant to the present invention.

Fig. 2 is a plan view thereof.

Fig. 3 is an enlarged, fragmentary, plan view of the vehicle per se, eliminating the boom and platform assembly.

Fig. 4 is an enlarged, fragmentary, side elevational view of the boom structure.

Fig. 5 is a fragmentary, perspective view showing the innermost end of the boom and the adjacent components; and

Fig. 6 is a fragmentary, front perspective view showing a portion of the platform and associated parts.

All of the components of the invention illustrated in the drawings are mounted upon, and supported by, a mobile vehicle broadly designated by the numeral 10 that is provided with a rear wheel and axle assembly 12, and a front caster wheel 14 adapted to rotate freely about a vertical axis 16. A novel frame 18 includes a pair of longitudinal members 20 and 22 that couple with

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axle housing 24 of the assembly 12 and extend horizontally and forwardly therefrom.

Members 20 and 22 terminate at the forwardmost ends thereof in portions 26 and 28 respectively, and extend upwardly and forwardly, as seen in Fig. 1, and inwardly in converging relationship at the front of the vehicle 10 in the manner best seen by Fig. 3. The portions 26 and 28 in turn terminate in short horizontal portions 30 and 32 respectively, overlying the wheel 14 and converging to a point of interconnection at the vertical axis 16 of wheel 14 in the manner shown in Fig. 4. Additional bracing for the frame 18 may be provided in the form of angularly disposed elements 34 interconnecting portions 20 and 26 and portions 22 and 28.

Frame portions 26 and 28 are interconnected by a transverse member 36 having mounted thereon structure for supporting a boom 38 which is in the nature of an upstanding mast 40. Mast 40 is rotatable about its vertical axis and the means for so supporting mast 40 includes a socket 42 on the cross member 36, rotatably receiving the lowermost end of the mast 40 and a collar 44 rotatably receiving the mast 40 intermediate its end. Collar 44 is in turn supported by downwardly and forwardly sloping structure 46 that connects with frame parts 30 and 32.

Tubular boom 38 is attached to the mast 40 at the uppermost end of the latter for vertical swinging movement through the medium of a horizontal pin 48 and such swinging movement of the boom 38 takes place upon operation of a hydraulic piston and cylinder assembly broadly designated by the numeral 50 which pivotally interconnects mast 40 and boom 38 below the latter, and forwardly of the mast 40 in the manner best seen in Fig. 4.

It is to be noted that the actuating assembly 50 rotates with the mast 40 and with the boom 38 as a unit about the vertical axis of mast 40 and the latter is caused to rotate upon actuation of another hydraulic piston and cylinder assembly broadly designated by the numeral 52. The assembly 52 pivotally interconnects mast 40 with frame 18, and to this end, there is provided a lateral extension 54 on the mast 40 receiving one end of the assembly 52 and a standard 56 receiving the opposite end of the assembly 52 and extending upwardly from the frame portion 28.

A workman's platform broadly designated by the numeral 58, is attached to the boom 38 at the outermost end of the latter remote from mast 40. Platform 58 is vertically swingable relative to boom 38 by virtue of a horizontal pivot pin 60 forming the means of connection of platform 58 to the boom 38. However, the swinging movement of the platform 58 relative to boom 38 is limited by an equalizer link 62 that pivotally connects platform 58 with mast 40. Thus, as the boom 38 and, therefore, the platform 58, are caused to swing vertically through operation of the assembly 50 in the manner illustrated by Fig. 1 of the drawings, the platform 58 is maintained essentially in an upright position by action of equalizer link 62.

All of the power requirements of the machine are supplied by a single prime mover 64 such as an internal combustion engine suitably supported by the frame 18 between the framepieces 20 and 22 forwardly of the assembly 12, and of course, behind the wheel 14.

Wheels 66 and 68 of the assembly 12 are powered through a conventional differential (not shown) within housing 70 and such differential is in turn operably coupled with transmission 72 through chain 74 and its related parts. Transmission 72 is in turn driven directly from the engine 64 by belt and pulley means 76. Any suitable throttle control (not shown) for the engine 64 may be provided on the platform 58 and operably coupled with

the engine 64 through a flexible line extending rearwardly and inwardly from the platform 58 to the engine 64.

The hydraulic components for the assemblies 50 and 52 are also operated from the engine 64 including in the usual manner, a pump 78, reservoir 80, and operable conduit connections with the cylinders of assemblies 50 and 52, as well as with the valve controls about to be described, it being noted that pump 78 is connected directly with the crank shaft of engine 64.

Each of the wheels 66 and 68 is provided with a hydraulic brake 82, and each brake is in turn controlled by a foot pedal 84 carried by the platform 58 as seen in Fig. 2. Transmission 72 is also controlled from the platform 58 for fore and aft movement of the vehicle by means of a swingable lever 86 on the platform 58.

Finally, through the medium of tiltable foot pedals 88 on platform 58, the operator is able to control the two assemblies 50 and 52. To this end, as best seen in Fig. 5, three triangular plates 90, 92 and 94 are swingably mounted on the pivot shaft 48 and a corresponding set of three cranks 96, 98 and 100 are swingably mounted on the pivot shaft 60 (see Fig. 6). Plate 90 and crank 96 are pivotally interconnected by link 102, plate 92 and crank 98 are pivotally coupled by elongated link 104, and plate 94 is pivotally coupled with crank 100 through a link 106, all of such links 102, 104 and 106 passing through the boom 38 as seen in Fig. 4.

Control valves 108 and 110 for assemblies 50 and 52 respectively, are mounted in side-by-side relationship on the mast 40 for rotation therewith and are manifestly coupled with the hydraulic system which includes the assemblies 50 and 52. Manual levers 112 and 114 for the control valves 108 and 110 respectively, are vertically swingable and operably coupled with plates 90 and 94 respectively through links 116 and 118.

The tiltable foot pedals 88 are operably coupled with corresponding cranks 96 and 100, through links, one of which is shown in Fig. 4 and designated by the numeral 120. Another such link 122 pivotally connects the lever 86 with the centermost crank 98.

Plate 92 corresponding to lever 86, has a link 124 pivotally connected thereto and extending through the mast 40, it being noted also that the two links 116 and 118 are housed by the mast 40. An operable connection is provided between the link 124 and the transmission 72 which includes, as seen in Figs. 3 and 4, crank 126, linkage 128, rotatable shaft 130, and links 132.

A master cylinder is provided for each brake 82 respectively, beneath platform 58, one of which may be seen in Fig. 4 and designated by the numeral 134. Lines 136 for brake fluid extend from master cylinders 134, around the pivot shaft 60, through the boom 38, around the pivot shaft 48, downwardly through the mast 40, and thence rearwardly to an operable connection with the corresponding brakes 82 as noted in Figs. 2, 3 and 4. Each foot pedal 84 is mounted on a crank 138 swingable on the platform 58 and pivotally connected with the corresponding master cylinder 134.

The operator is protected by an upstanding cage 140 on the platform 58 in any suitable manner. Oftentimes the workman on the platform 58 needs compressed fluids readily available and to this end, there is shown in Fig. 3 a unit broadly designated by the numeral 142 operably coupled with the engine 64 to provide such pressure. It may be conveniently conveyed to a point of use adjacent the platform 58 through the medium of equalizer bar 62 which is tubular and provided with a connection 144 with the unit 142, as well as an outlet hose or the like 146.

A hood 148 covering the components shown in Fig. 3 and carried by the frame 18 between the wheels 66 and 68, underlies the boom 38 and slopes downwardly and rearwardly as at 150 to permit full lowering of the boom 38 as shown by dotted lines in Fig. 1.

After starting the engine 64, the platform 58 may be lowered substantially to the ground as shown in Fig. 1

by actuating the lever 112 for the control valve 108, which is in turn operably coupled with assembly 50 as above set forth. The operator need merely then step into the cage 140 and, standing on the platform 58, he is able to control all movements. First, by tilting one of the foot pedals 88 in one direction, valve 108 is opened in a manner to cause extension of the assembly 50 and, therefore, raising of the platform 58 to the full-line position shown in Fig. 1, or to the dash-line position thereabove. By the same token, the operator on platform 58 may control the horizontal swinging of platform 58 in the manner shown in Fig. 2. This is accomplished by tilting the other foot pedal 88 in one direction to control the valve 110 and, therefore, the hydraulic assembly 52.

In any position of the platform 58, the operator may cause the vehicle 10 to move forwardly or in reverse by swinging of the lever 86 in the proper direction. Finally, while the transmission 72 is operating, depressing of one of the foot pedals 84 will apply the corresponding brake 82, causing the vehicle to execute a turn. Noteworthy is the fact that, when one of the brakes 82 is thus applied, caster wheel 14 swivels freely about its vertical axis 16.

When the pedals 88 are actuated, a push-pull action is imparted to the corresponding links 120 to swing either crank 96 or 100, which in turn imparts a push-ball motion to the corresponding links 102 and 106 respectively. Links 102 and 106 in turn swing the plates 90 and 94, causing the links 116 and 118 to move vertically, thereby swinging the levers 110 and 112 for valves 108 and 110 respectively.

By the same token, when the lever 86 is caused to swing fore or aft, transmission 72 is controlled through link 122, the centermost crank 98, line 104, plate 92, link 124, and the operable connection with transmission 72 which includes parts 126, 128, 130 and 132.

Noteworthy also is that either or both of the brakes 82 may be applied and held by virtue of the fact that the pedals 84 are provided with notched means 152 engageable with the platform 58.

An important feature of the invention lies in the fact that a relatively small tricycle arrangement may be provided in the vehicle 10 without danger of upsetting, and to this end, the extent of horizontal swinging movement of the platform 58 is preferably limited substantially as shown in Fig. 2.

The arrangement is such also that platform 58 may be lowered substantially to the ground, hence the provision of mast 40 rising above the highest portion 30—32 of frame 18. Thus, as seen in Fig. 1, when the boom 38 is centrally disposed and lowered, it is interposed between the wheels 66 and 68 adjacent the inclined portion 150 of hood 148. The disposition of all of the power components including engine 64, forwardly of the rear axle and upon the under-slung portions 20 and 22 of the frame 18, permit of such lowering of the platform 58. Furthermore, so far as stability is concerned, the machine is capable of supporting a substantial amount of weight on the platform 58 because of the way in which the boom 38 extends from adjacent the front of the machine to a point extending rearwardly beyond the assembly 12.

In any event, each movement, i.e., ascent and descent of the platform 58, horizontal swinging thereof, fore and aft movement of the vehicle 10, and turning movement of the vehicle as controlled by brakes 82, are all mutually independent and, therefore, the operator may maneuver the machine at any time irrespective of his position either vertically or horizontally.

Having thus described the invention what is claimed as new and desired to be secured by Letters Patent is:

In a machine of the class described, the combination of: a vehicle frame having an elevated and forwardly tapered front portion and a relatively wider and lower rear portion; axle means laterally traversing said rear portion and mounted on the latter; a pair of ground-

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engaging wheels operably mounted on said axle means at opposite extremities of the latter; a prime mover on the frame operably coupled with said axle means for driving the latter; a third ground-engaging wheel; caster means rotatably carrying said third wheel and pivotally mounted on said front portion beneath the latter; a vertical mast rotatably mounted atop said front portion rearwardly of the vertical axis of casting and the horizontal axis of rotation of said third wheel; an elongated boom pivotally mounted at one end thereof on the mast adjacent the top of the latter and extending rearwardly therefrom beyond the rear of the frame; a platform adapted for carrying a workman mounted at the opposite end of the boom; power means operably coupled with the frame and the mast for rotating the latter through a limited, acute, horizontal angle only, said angle being bounded by vertical planes through the axis of rotation of the mast and each of said pair of wheels respectively; and power means operably coupled with

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the mast and the boom for swinging the latter through a limited, acute, vertical angle only, the lower extreme of said vertical angle disposing the boom in downwardly inclined relation to the mast with the platform below and rearwardly of said axle means, the upper extreme of said vertical angle disposing the boom in upwardly inclined relation to the mast with the platform above and rearwardly of said axle means.

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